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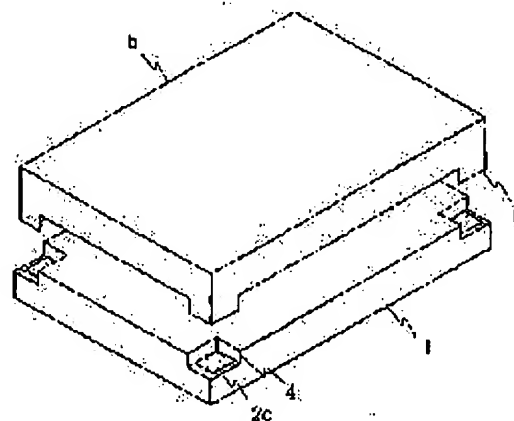
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## (54) ELECTRONIC EQUIPMENT

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide highly productive electronic equipment whose whole structure can be simplified, and whose manufacturing process can be simplified.

**SOLUTION:** In this electronic equipment configured by disposing a high frequency circuit on a multi-layer wiring board 1 on which a plurality of insulating layers are laminated, and ground wiring 2c is interposed between those insulating layers, and mounting a metallic shield case 5 covering the upper face of the multi-layer wiring board 1 to the upper part, a plurality of notches 4 are formed in at least the uppermost layer of the insulating layers so that a part of the ground wiring 2c can be exposed, and the lower edges of bonding leg parts 6 erected at the outer peripheral parts of the shield case 5 are butted to the ground wiring 2c exposed in the notches 4 so as to be bonded.



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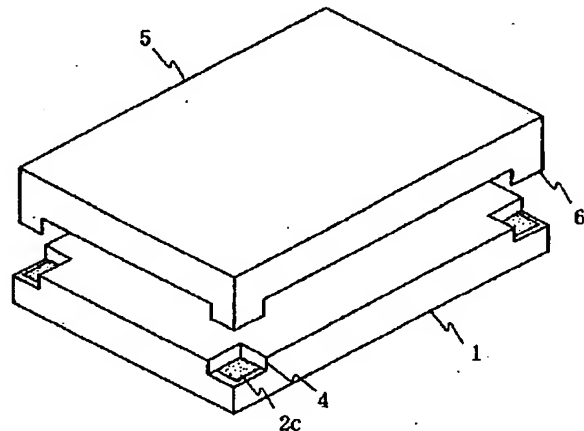
GG08 GG40 HH01

(54) 【発明の名称】 電子装置

(57) 【要約】

【課題】 全体構造を簡素化して、製造プロセスを簡略化することができる高生産性の電子装置を提供する。

【解決手段】 複数の絶縁層が積層され、これら絶縁層間にグラウンド配線2cが介在されている多層配線基板1に高周波回路を設け、その上に多層配線基板1の上面を被覆する金属製のシールドケース5を取着させてなる電子装置において、前記絶縁層のうち少なくとも最上層に複数の切り欠き4を形成してグラウンド配線2cの一部を露出させるとともに、該切り欠き4内に露出したグラウンド配線2cに対し前記シールドケース5の外周部に立設した接合脚部6の下端を当接させて接合する。



## 【特許請求の範囲】

【請求項 1】複数個の絶縁層が積層され、これら絶縁層間にグランド配線が介在されている多層配線基板に高周波回路を設け、その上に前記多層配線基板の上面を被覆する金属製のシールドケースを取着させてなる電子装置において、

前記絶縁層のうち少なくとも最上層に複数個の切り欠きを形成してグランド配線の一部を露出させるとともに、該切り欠き内に露出したグランド配線に対し前記シールドケースの外周部に立設した接合脚部の下端を当接させて接合したことを特徴とする電子装置。

【請求項 2】前記接合脚部の下端が内側に折り曲げられるとともに、該折り曲げ部の上下両側に接合用の導電性接着材が配されていることを特徴とする請求項 1 に記載の電子装置。

【請求項 3】前記多層配線基板が矩形状を成しており、且つ前記切り欠きが多層配線基板の四隅に配されていることを特徴とする請求項 1 乃至請求項 3 のいずれかに記載の電子装置。

【請求項 4】前記切り欠き内に露出するグランド配線の外周縁が、前記多層配線基板の外周縁よりも内側に所定距離だけ離間して配されていることを特徴とする請求項 1 乃至請求項 3 のいずれかに記載の電子装置。

【請求項 5】前記シールドケースの接合脚部が、前記切り欠きに臨む絶縁層の端面に当接されていることを特徴とする請求項 1 乃至請求項 4 のいずれかに記載の電子装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、携帯電話機やパーソナルコンピュータ等の通信機器に組み込まれる高周波用の電子装置に関するものである。

## 【0002】

【従来の技術】従来より、携帯電話機等の通信機器に高周波回路を備えた電子装置が用いられている。

【0003】かかる従来の電子装置としては、例えば図 5 に示す如く、内部に高周波回路を備えたセラミック製の多層配線基板 11 上に、その上面を被覆するようにして金属製のシールドケース 12 を取着させた構造のものが知られており、その使用時、シールドケース 12 を基準電位 (GND) に保持して、外部からのノイズを遮蔽することにより、高周波回路の特性安定化を図るようにしている。

【0004】尚、前記シールドケース 12 は、その外周部に立設した接合脚部 13 を多層配線基板 11 のグランド配線に電気的に接続させること、具体的には、接合脚部 13 を、グランド配線に電気的に接続された多層配線基板 11 の端面スルーホール内に挿入して端面スルーホール電極 14 に半田接合させておくことにより、電子装置の使用時、基準電位に保持されるようになっており、

また、この半田接合によってシールドケース 12 が多層配線基板 11 に取着・固定されることとなる。

## 【0005】

【発明が解決しようとする課題】しかしながら、上述した従来の電子装置においては、シールドケース 12 の接合脚部 13 を多層配線基板 11 に半田接合すべく、多層配線基板 11 の端面に端面スルーホール電極 14 が形成されている。このような端面スルーホール電極 14 を多層配線基板 11 に設けるには、多層配線基板 11 を貫通させるための孔あけ加工やスルーホール内面への電極の被着・形成など、極めて煩雑な製造プロセスが必要となることから、電子装置を製造するための工程数が多くなってしまい、生産性の低下を招く欠点を有していた。

【0006】また上述した従来の電子装置においては、その組立時、長細状に形成されたシールドケース 12 の接合脚部 13 を直径 0.4 mm ~ 0.8 mm 程度の小さな端面スルーホールに挿入しなければならないことから、その作業性が極めて悪く、接合脚部 13 の挿入に伴い接合脚部 13 が多層配線基板 11 に衝突すると、接合脚部 13 が折れ曲がってしまったり、或いは、シールドケース 12 が多層配線基板 11 に対して傾いた状態で取着される等といった不具合が発生することがあり、これによっても電子装置の生産性低下を招く欠点が誘発されていた。

【0007】本発明は上記欠点を鑑み案出されたもので、その目的は、全体構造を簡素化して、製造プロセスを簡略化することができる高生産性の電子装置を提供することにある。

## 【0008】

【課題を解決するための手段】本発明の電子装置は、複数個の絶縁層が積層され、これら絶縁層間にグランド配線が介在されている多層配線基板に高周波回路を設け、その上に前記多層配線基板の上面を被覆する金属製のシールドケースを取着させてなる電子装置において、前記絶縁層のうち少なくとも最上層に複数個の切り欠きを形成してグランド配線の一部を露出させるとともに、該切り欠き内に露出したグランド配線に対し前記シールドケースの外周部に立設した接合脚部の下端を当接させて接合したことを特徴とするものである。

【0009】また本発明の電子装置は、前記接合脚部の下端が内側に折り曲げられるとともに、該折り曲げ部の上下両側に接合用の導電性接着材が配されていることを特徴とするものである。

【0010】更に本発明の電子装置は、前記多層配線基板が矩形状を成しており、且つ前記切り欠きが多層配線基板の四隅に配されていることを特徴とするものである。

【0011】また更に本発明の電子装置は、前記切り欠き内に露出するグランド配線の外周縁が、前記多層配線基板の外周縁よりも内側に所定距離だけ離間して配され

ていることを特徴とするものである。

【0012】更にまた本発明の電子装置は、前記シールドケースの接合脚部が、前記切り欠きに臨む絶縁層の端面に当接されていることを特徴とするものである。

【0013】本発明の電子装置によれば、多層配線基板を構成する絶縁層のうち少なくとも最上層に複数の切り欠きを形成して多層配線基板の内部に設けられているグラウンド配線の一部を露出させるとともに、該切り欠き内に露出したグラウンド配線に対してシールドケース外周部の接合脚部を接合させるようにしたことから、シールドケースとの接合に先立って多層配線基板側に必要な加工としては、多層配線基板の上部に積層されるセラミックグリーンシート等を所定形状に打ち抜くだけの簡単な作業となり、従来例の電子装置の如く多層配線基板側の接合部に端面スルーホール電極等を形成する必要はない。従って、端面スルーホール電極の形成に伴う孔あけ加工やスルーホール内面への電極の被着など、煩雑な製造プロセスは一切不要となり、多層配線基板の製造プロセスを簡略化して電子装置の生産性を向上させることが可能となる。

【0014】また本発明の電子装置によれば、シールドケースの接合脚部下端を多層配線基板の上面に露出させたグラウンド配線に当接させた状態で接合するようになっており、しかも接合脚部の長さは多層配線基板を構成する絶縁層の1層分乃至数層分の厚みに相当する短い長さで良いことから、シールドケースを多層配線基板上に取着する際、接合脚部が多層配線基板と当たって折れ曲がったり、シールドケースが多層配線基板に対して傾いた状態で取着されるといった不都合を生じることは殆どなく、多層配線基板に対するシールドケースの取着作業が簡単かつ良好なものとなり、これによっても電子装置の生産性向上に供することができる。

【0015】更に本発明の電子装置によれば、上記切り欠きを多層配線基板の四隅に配し、この4箇所ではシールドケースの接合脚部を接合させることにより、シールドケースをより安定した状態で多層配線基板上に取着させることができる。

【0016】また更に本発明の電子装置によれば、上記切り欠き内に露出するグラウンド配線の外周縁を多層配線基板の外周縁よりも内側に所定距離だけ離間して配しておくことにより、多層配線基板を多数個取りによって製作する場合に、大型基板の分割・切断時、グラウンド配線に対して切断用のカッターが接触するのが有効に防止されることから、グラウンド配線のエッジが切断に伴い下地より剥離するといった不都合を生じることはなく、これによっても電子装置の生産性を向上させることができる。

【0017】更にまた本発明の電子装置によれば、上記シールドケースの接合脚部を切り欠きに臨む絶縁層の端面に当接させた状態でシールドケースを多層配線基板に

取着させることにより、多層配線基板に対するシールドケースの位置合わせをより正確に、かつ簡単に行うことができるようになり、これによっても電子装置の生産性及び信頼性が向上される。

【0018】以下、本発明を添付図面に基づいて詳細に説明する。図1は本発明の一実施形態に係る電子装置の分解斜視図、図2は図1の電子装置の断面図であり、同図に示す電子装置は、大略的に、多層配線基板1とシールドケース5とで構成されている。

10 【0019】前記多層配線基板1は、複数の絶縁層1aを積層してなる略矩形状の積層体により構成されており、これら絶縁層間にはグラウンド配線2cを含む多数の配線2が介在され、これらの配線2を絶縁層1a中に埋設されているビアホール導体2b等を介して相互に電気的に接続させている。

【0020】このような多層配線基板1を構成する絶縁層1aの材質としては、例えばガラスセラミックス等のセラミック材料が用いられ、個々の絶縁層1aの厚みは例えば50 $\mu\text{m}$ ～300 $\mu\text{m}$ に設定される。

20 【0021】前記多層配線基板1は、絶縁層1aがセラミック材料から成る場合、セラミック原料の粉末に適当な有機溶剤、有機溶媒等を添加・混合して得たセラミックグリーンシートを複数層積層した上、これをプレス成形し、しかる後、この積層体を高温で焼成し、外形加工することによって製作される。

【0022】一方、前記多層配線基板1の内部や上面に設けられる配線2やビアホール導体2bの材質としては、例えば、銀を主成分とする導電材料が好適に用いられ、個々の配線2の厚みは例えば5 $\mu\text{m}$ ～20 $\mu\text{m}$ に設定される。

30 【0023】前記配線2は、多層配線基板1を上述の製法によって製作する際、セラミックグリーンシートを積層する前に、銀粉末を含む導電ペーストを従来周知のスクリーン印刷等によって各セラミックグリーンシートの表面に所定パターンに印刷・塗布しておき、これをセラミックグリーンシートの焼成時に同時焼成することにより形成される。

【0024】尚、前記ビアホール導体2bは、セラミックグリーンシートに予め設けておいた貫通孔の内部にスクリーン印刷等によって導電ペーストを塗布・充填しておき、これをセラミックグリーンシートの焼成時に同時焼成することにより形成される。

【0025】またこのような多層配線基板1の内部もしくは上面には、高周波回路として、ストリップラインやチップ状の半導体素子や圧電素子、コンデンサ、インダクタが設けられる。

【0026】前記高周波回路がストリップライン等によって構成される場合、先に述べた配線2や絶縁層1aを用いて高周波回路が形成され、その場合、絶縁層1aとしては誘電率の高い誘電体材料が用いられる。

【0027】一方、前記高周波回路がチップ状の半導体素子や圧電素子等によって構成される場合、従来周知のフェースダウンボンディング、或いは、ワイヤボンディング等によって多層配線基板上に搭載され、半田等の導電性接着剤やAu等から成る金属細線等を介して多層配線基板の対応する配線2にボンディングされる。

【0028】更にまた、上述した多層配線基板1は、それを構成する複数の絶縁層1aのうち少なくとも最上層に複数の切り欠き4が設けられ、切り欠き4の内側にグランド配線2cの一部を露出させている。

【0029】前記切り欠き4は、後述するシールドケース5の接合脚部6が接合されるグランド配線2cの表面を露出させるためのものであり、この露出部より上方に位置する絶縁層1aには全て同様の切り欠きが形成される。例えば、グランド配線2cが絶縁層1aの最上層と第2層（上から2層目の絶縁層）との間に設けられている場合、最上層の絶縁層1aにのみ切り欠きが設けられ、またグランド配線2cが絶縁層1aの第2層と第3層との間に設けられている場合、最上層及び第2層の絶縁層1aを貫通する形の切り欠き4が設けられる。

【0030】尚、このような切り欠き4に臨む絶縁層1aの端面は、例えば曲率半径0.2mm~0.4mmの凹曲面状に加工しておくことが好ましく、そのようにしておけば、多層配線基板1の焼成時等に多層配線基板1に切り欠き4を起点とする割れ等が発生するのを有効に防止することができる。

【0031】そして、上述した多層配線基板1上には、多層配線基板1の上面を被覆するシールドケース5が取着される。前記シールドケース5は、鉄や洋白、りん青銅等の金属により略矩形状をなすように形成されており、その外周部、具体的には、角部4箇所に長さの比較

【0032】前記シールドケース5の各接合脚部6は、その下端が内側に折り曲げられた上、多層配線基板1の四隅に設けたグランド配線2cの露出部に当接させた状態で半田接合されており、かかる接合用の半田7は、図3に示す如く、その一部が接合脚部6の折り曲げ部上に収容されて、折り曲げ部に対し上下両側に配された形となっている。

【0033】このように、シールドケース5の接合脚部6の下端を多層配線基板1の上面に露出させたグランド配線2cに当接させた上、両者を接合するようにしたことから、シールドケース5との接合に先立って多層配線基板1側に必要な加工としては、多層配線基板1の上部に積層されるセラミックグリーンシート等を所定形状に打ち抜くだけの簡単な作業となり、従来例の電子装置の如く多層配線基板1側の接合部に端面スルーホール電極等を形成する必要はない。従って、端面スルーホール電極の形成に伴う孔あけ加工やスルーホール内面への電極の被着など、煩雑な製造プロセスは一切不要となり、多層配

線基板1の製造プロセスを簡略化して電子装置の生産性を向上させることが可能となる。

【0034】また前記シールドケース5は、接合脚部6の下端を多層配線基板1の上面に露出させたグランド配線2cに当接させた状態で接合するようになっており、しかも接合脚部6の長さは多層配線基板1を構成する絶縁層の1層分乃至数層分の厚みに相当する短い長さで良いことから、シールドケース5を多層配線基板1上に取着する際、接合脚部6が多層配線基板1と当たって折れ曲がったり、シールドケース5が多層配線基板1に対して傾いた状態で取着されるといった不都合は殆どなく、これによっても電子装置の生産性向上に供することができる。

【0035】尚、このような接合脚部6の長さは、切り欠き4を設けた絶縁層1aの総厚みよりも若干長くしておくことが好ましく、例えば、切り欠き部の厚みが150μmの場合、接合脚部6の長さは200μm程度に設定される。

【0036】更に前記切り欠き4は、多層配線基板1の四隅にそれぞれ配されており、シールドケース5の接合脚部6が多層配線基板1の四隅で接合されるようになっているため、シールドケース5をより安定した状態で多層配線基板1上に取着させることができる。

【0037】またこの場合、切り欠き4内に露出するグランド配線2cの外周縁を多層配線基板1の外周縁よりも内側に所定距離だけ離間して配しておくようにすれば、多層配線基板1を製作するのに大型基板を分割して“多数個取り”する場合であっても、大型基板の分割・切断時、グランド配線2cと切断用のカッターとが接触することはないことから、グランド配線2cのエッジが切断に伴い下地より剥離するといった不都合を生じることなく、これによっても電子装置の生産性を向上させることができる利点もある。従って、切り欠き4内に露出するグランド配線2cの外周縁は、多層配線基板1の外周縁よりも内側に所定距離だけ離間して配しておくことが好ましい。

【0038】また更に前記シールドケース5の接合脚部6を切り欠き4に臨む絶縁層1aの端面に当接させた状態で多層配線基板1に取着するようにしておけば、多層配線基板1に対するシールドケースの位置合わせをより正確に、かつ簡単に行うことができ、これによっても電子装置の生産性及び信頼性が向上されるようになる。従って、シールドケース5の接合脚部6を切り欠き4に臨む絶縁層1aの端面に当接させた状態でシールドケース5を多層配線基板1に取着させることが好ましい。

【0039】かくして上述した電子装置は、その使用時、シールドケース5が接合脚部6及びグランド配線2cを介して基準電位（グランド電位）に保持されるようになっており、これによって外部からのノイズをシールドケース5によって良好に遮蔽することができるとも

に、多層配線基板 1 の高周波回路に供給される高周波の電磁波が他のデバイスや他の電子装置に悪影響を及ぼすのが有効に防止されることとなる。

【0040】尚、本発明は上述の実施形態に限定されるものではなく、本発明の要旨を逸脱しない範囲内で種々の変更、改良等が可能である。

【0041】例えば上述の実施形態では、シールドケースの接合脚部と多層配線基板のグランド配線とを接合するための導電性接着剤として半田を用いたが、これに代えて、導電性樹脂等の半田以外の導電性接着剤を用いて

【0042】また上述の実施形態においては、多層配線基板をガラスセラミックスにより形成するようにしたが、これに代えて、アルミナセラミックスやガラス布基材エポキシ樹脂等の他の材料を用いて多層配線基板を形成するようにしても構わない。

【0043】

【発明の効果】本発明の電子装置によれば、多層配線基板を構成する絶縁層のうち少なくとも最上層に複数個の切り欠きを形成して多層配線基板の内部に設けられているグランド配線の一部を露出させるとともに、該切り欠き内に露出したグランド配線に対してシールドケース外周部の接合脚部を接合させるようにしたことから、シールドケースとの接合に先立って多層配線基板側に必要な加工としては、多層配線基板の上部に積層されるセラミックグリーンシート等を所定形状に打ち抜くだけの簡単な作業となり、従来例の電子装置の如く多層配線基板側の接合部に端面スルーホール電極等を形成する必要はない。従って、端面スルーホール電極の形成に伴う孔あけ加工やスルーホール内面への電極の被着など、煩雑な製造プロセスは一切不要となり、多層配線基板の製造プロセスを簡略化して電子装置の生産性を向上させることが可能となる。

【0044】また本発明の電子装置によれば、シールドケースの接合脚部下端を多層配線基板の上面に露出させたグランド配線に当接させた状態で接合するようになっており、しかも接合脚部の長さは多層配線基板を構成する絶縁層の 1 層分乃至数層分の厚みに相当する短い長さで良いことから、シールドケースを多層配線基板上に取着する際、接合脚部が多層配線基板と当たって折れ曲がったり、シールドケースが多層配線基板に対して傾いた状態で取着されるといった不都合を生じることは殆どなく、多層配線基板に対するシールドケースの取着作業が

簡単かつ良好なものとなり、これによっても電子装置の生産性向上に供することができる。

【0045】更に本発明の電子装置によれば、上記切り欠きを多層配線基板の四隅に配し、この 4 箇所ではシールドケースの接合脚部を接合させることにより、シールドケースをより安定した状態で多層配線基板上に取着させることができる。

【0046】また更に本発明の電子装置によれば、上記切り欠き内に露出するグランド配線の外周縁を多層配線基板の外周縁よりも内側に所定距離だけ離間して配しておくことにより、多層配線基板を多数個取りによって製作する場合に、大型基板の分割・切断時、グランド配線に対して切断用のカッターが接触するのが有効に防止されることから、グランド配線のエッジが切断に伴い下地より剥離するといった不都合を生じることはなく、これによっても電子装置の生産性を向上させることができる。

【0047】更にまた本発明の電子装置によれば、上記シールドケースの接合脚部を切り欠きに臨む絶縁層の端面に当接させた状態でシールドケースを多層配線基板上に取着させることにより、多層配線基板に対するシールドケースの位置合わせをより正確に、かつ簡単に行うことができるようになり、これによっても電子装置の生産性及び信頼性が向上される。

【図面の簡単な説明】

【図 1】本発明の一実施形態に係る電子装置の分解斜視図である。

【図 2】本発明の一実施形態に係る電子装置の断面図である。

【図 3】図 2 の要部拡大図である。

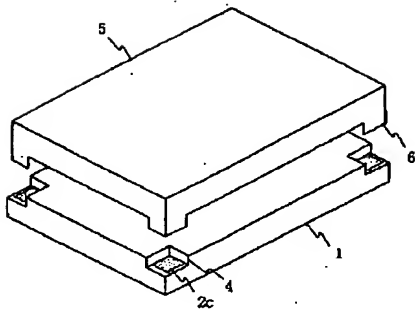
【図 4】グランド配線の露出部外周縁と多層配線基板の外周縁との位置関係を示す平面図である。

【図 5】従来の電子装置の斜視図である。

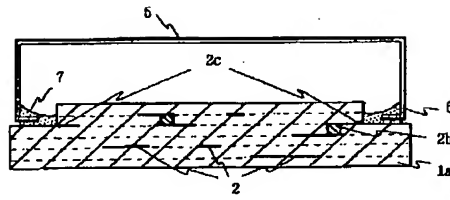
【符号の説明】

- 1・・・多層配線基板
- 1a・・・絶縁層
- 2・・・配線
- 2c・・・グランド配線
- 4・・・切り欠き
- 5・・・シールドケース
- 6・・・接合脚部
- 7・・・半田（導電性接着剤）

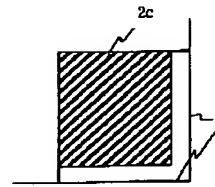
【図 1】



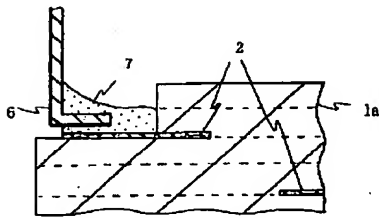
【図 2】



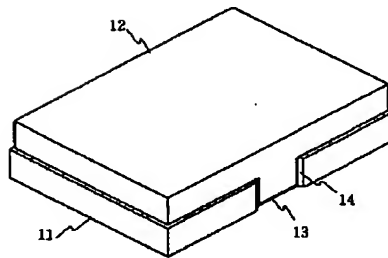
【図 4】



【図 3】



【図 5】





**\* NOTICES \***

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] In the electronic instrument which the laminating of two or more insulating layers is carried out [ electronic instrument ], and a RF circuit is established [ electronic instrument ] in the multilayer-interconnection substrate with which grand wiring intervenes among these insulating layers, and makes it come to attach on it the metal shielding case which covers the top face of said multilayer-interconnection substrate The electronic instrument characterized by having made the lower limit of the junction leg set up in the periphery section of said shielding case to grand wiring exposed in this notching contact, and joining while forming two or more notching in the maximum upper layer at least among said insulating layers and exposing some grand wiring.

[Claim 2] The electronic instrument according to claim 1 characterized by arranging the conductive binder for junction on the vertical both sides of this bending section while the lower limit of said junction leg is bent inside.

[Claim 3] The electronic instrument according to claim 1 to 3 characterized by for said multilayer-interconnection substrate having constituted the shape of a rectangle, and allotting said notching to the four corners of a multilayer-interconnection substrate.

[Claim 4] The electronic instrument according to claim 1 to 3 with which the periphery edge of grand wiring exposed in said notching is characterized by

estranging and allotting only predetermined distance inside the periphery edge of said multilayer-interconnection substrate.

[Claim 5] The electronic instrument according to claim 1 to 4 characterized by the junction leg of said shielding case being contacted by the end face of the insulating layer which attends said notching.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electronic instrument for RFs built into communication equipment, such as a portable telephone and a personal computer.

[0002]

[Description of the Prior Art] Conventionally, the electronic instrument which equipped communication equipment, such as a portable telephone, with the RF circuit is used.

[0003] he be try to attain property stabilization of a RF circuit as this conventional electronic instrument , by know the thing of structure which made the metal

shielding case 12 attach on the multilayer interconnection substrate 11 made from the ceramic which equipped the interior with the RF circuit as the top face be covered [ thing ] , hold a shielding case 12 to a reference potential (GND ) , and cover the noise from the outside at the time of the use , as show , for example in drawing 5 R> 5 .

[0004] in addition, said shielding case 12 the junction leg 13 set up in the periphery section on making it connect with grand wiring of the multilayer-interconnection substrate 11 electrically, and a concrete target By inserting the junction leg 13 into the end-face through hole of the multilayer-interconnection substrate 11 electrically connected to grand wiring, and joining it with solder to the end-face through hole electrode 14 At the time of use of an electronic instrument, it will be held at a reference potential, and a shielding case 12 will be attached and fixed by the multilayer-interconnection substrate 11 by this soldered joint.

[0005]

[Problem(s) to be Solved by the Invention] However, in the conventional electronic instrument mentioned above, the end-face through hole electrode 14 is formed in the end face of the multilayer-interconnection substrate 11 that the junction leg 13 of a shielding case 12 should be joined by solder to the multilayer-interconnection substrate 11. Since very complicated manufacture processes, such as perforation processing for making the multilayer-interconnection substrate 11 penetrate, and covering, formation of the electrode to a through hole inside, were needed in order to have formed such an end-face through hole electrode 14 in the multilayer-interconnection substrate 11, the routing counter for manufacturing an electronic instrument increased, and it had the fault which causes the fall of productivity.

[0006] moreover, in the conventional electronic instrument mentioned above, the junction leg 13 of the shielding case 12 formed in the shape of long \*\* from it having to insert in a small end-face through hole with a diameter of 0.4mm - about 0.8mm at the time of the assembly When the workability is very bad and

the junction leg 13 collides with the multilayer-interconnection substrate 11 with insertion of the junction leg 13, the junction leg 13 bends or The fault which may generate the fault of being attached after the shielding case 12 has inclined to the multilayer-interconnection substrate 11 etc., and causes the productivity slowdown of an electronic instrument also by this was induced.

[0007] This invention was thought out in view of the above-mentioned fault, and the purpose simplifies whole structure and is to offer the electronic instrument of the sex from Takao which can simplify a manufacture process.

[0008]

[Means for Solving the Problem] The laminating of two or more insulating layers is carried out, and the electronic instrument of this invention establishes a RF circuit in the multilayer-interconnection substrate with which grand wiring intervenes among these insulating layers. While forming two or more notching in the maximum upper layer at least among said insulating layers and exposing some grand wiring in the electronic instrument to which it makes it come to attach the metal shielding case which covers the top face of said multilayer-interconnection substrate on it It is characterized by having made the lower limit of the junction leg set up in the periphery section of said shielding case to grand wiring exposed in this notching contact, and joining.

[0009] Moreover, the electronic instrument of this invention is characterized by arranging the conductive binder for junction on the vertical both sides of this bending section while the lower limit of said junction leg is bent inside.

[0010] Furthermore, the electronic instrument of this invention is characterized by for said multilayer-interconnection substrate having constituted the shape of a rectangle, and allotting said notching to the four corners of a multilayer-interconnection substrate.

[0011] Furthermore, the periphery edge of grand wiring which exposes the electronic instrument of this invention in said notching is characterized by estranging only predetermined distance inside the periphery edge of said multilayer-interconnection substrate, and being allotted to it.

[0012] Furthermore, the electronic instrument of this invention is characterized by the junction leg of said shielding case being contacted by the end face of the insulating layer which attends said notching again.

[0013] While exposing some grand wiring which forms two or more notching in the maximum upper layer at least among the insulating layers which constitute a multilayer-interconnection substrate, and is prepared in the interior of a multilayer-interconnection substrate according to the electronic instrument of this invention From having made it join the junction leg of the shielding case periphery section to grand wiring exposed in this notching Junction to a shielding case is preceded. As processing required for a multilayer-interconnection substrate side It is not necessary to become the easy activity which pierces the ceramic green sheet by which a laminating is carried out to the upper part of a multilayer-interconnection substrate in a predetermined configuration, and to form an end-face through hole electrode etc. in the joint by the side of a multilayer-interconnection substrate like the electronic instrument of the conventional example. Therefore, complicated manufacture processes, such as perforation processing accompanying formation of an end-face through hole electrode and covering of the electrode to a through hole inside, become entirely unnecessary, and it becomes possible to simplify the manufacture process of a multilayer-interconnection substrate and to raise the productivity of an electronic instrument.

[0014] Moreover, it joins in the condition of having made the junction leg lower limit of a shielding case contacting grand wiring exposed on the top face of a multilayer-interconnection substrate according to the electronic instrument of this invention. and from a good thing, the die length of the junction leg by the short die length equivalent to one layer of an insulating layer thru/or the thickness for several layers which constitutes a multilayer-interconnection substrate In case a shielding case is attached on a multilayer-interconnection substrate, the junction leg hits with a multilayer-interconnection substrate, and bends, or There is almost nothing, the attachment activity of the shielding case over a multilayer-

interconnection substrate will become easy and good, and the productivity drive of an electronic instrument can be presented with producing un-arranging [ of being attached after the shielding case has inclined to a multilayer-interconnection substrate ] also by this.

[0015] Furthermore, according to the electronic instrument of this invention, a shielding case can be made to attach on a multilayer-interconnection substrate in the condition of having been stabilized more, by allotting the above-mentioned notching to the four corners of a multilayer-interconnection substrate, and joining the junction leg of a shielding case by these four places.

[0016] Furthermore, when only predetermined distance estranges and allots the periphery edge of grand wiring exposed in the above-mentioned notching inside the periphery edge of a multilayer-interconnection substrate according to the electronic instrument of this invention When manufacturing many multilayer-interconnection substrates by picking, at the time of division and cutting of a large-sized substrate Since it is prevented effectively that the cutter for cutting contacts to grand wiring, it cannot produce un-arranging [ that the edge of grand wiring exfoliates from a substrate with cutting ], and can raise the productivity of an electronic instrument also by this.

[0017] Furthermore, according to the electronic instrument of this invention, by making a multilayer-interconnection substrate attach a shielding case in the condition of having made the junction leg of the above-mentioned shielding case contacting the end face of the insulating layer which attends notching, alignment of a shielding case to a multilayer-interconnection substrate can be performed now more correctly and easily, and the productivity and dependability of an electronic instrument improve also by this again.

[0018] Hereafter, this invention is explained to a detail based on an accompanying drawing. The decomposition perspective view of the electronic instrument which drawing 1 requires for 1 operation gestalt of this invention, and drawing 2 are the sectional views of the electronic instrument of drawing 1 , and the electronic instrument shown in this drawing consists of a multilayer-

interconnection substrate 1 and a shielding case 5 in profile.

[0019] the beer hall which said multilayer-interconnection substrate 1 is constituted by the layered product of the shape of an abbreviation rectangle which comes to carry out the laminating of two or more insulating-layer 1a, and the wiring 2 of a large number containing grand wiring 2c intervenes among these insulating layers, and is laid underground into insulating-layer 1a in these wiring 2 -- a conductor -- it is made to connect mutually electrically through 2b etc.

[0020] As the quality of the material of insulating-layer 1a which constitutes such a multilayer-interconnection substrate 1, ceramic ingredients, such as crystallized glass, are used, for example, and the thickness of each insulating-layer 1a is set as 50 micrometers - 300 micrometers.

[0021] Said multilayer-interconnection substrate 1 carries out press forming of this, after carrying out two or more layer laminating of the ceramic green sheet which added and mixed the suitable organic solvent for the powder of a ceramic raw material, the organic solvent, etc., and obtained them, when insulating-layer 1a consists of a ceramic ingredient, after an appropriate time, calcinates this layered product at an elevated temperature, and is manufactured by carrying out appearance processing.

[0022] wiring 2 and the beer hall which are established in the interior and the top face of said multilayer-interconnection substrate 1 on the other hand -- a conductor -- as the quality of the material of 2b, the electrical conducting material which uses silver as a principal component is used suitably, for example, and the thickness of each wiring 2 is set as 5 micrometers - 20 micrometers.

[0023] In case the multilayer-interconnection substrate 1 is manufactured by the above-mentioned process, before carrying out the laminating of the ceramic green sheet, said wiring 2 prints and applies conductive paste including the end of silver dust on the front face of each ceramic green sheet by well-known screen-stencil etc. conventionally at the predetermined pattern, and is formed by carrying out coincidence baking of this at the time of baking of a ceramic green sheet.

[0024] in addition, said beer hall -- a conductor -- 2b is applied and filled up with conductive paste by screen-stencil etc. inside [ which was beforehand established in the ceramic green sheet ] the through tube, and is formed by carrying out coincidence baking of this at the time of baking of a ceramic green sheet.

[0025] Moreover, the semiconductor device and piezoelectric device of the shape of a stripline or a chip, a capacitor, and an inductor are prepared in such the interior or a top face of the multilayer-interconnection substrate 1 as a high frequency circuit.

[0026] When said RF circuit is constituted by the stripline etc., a RF circuit is formed using wiring 2 and insulating-layer 1a which were described previously, and dielectric materials with a dielectric constant high as insulating-layer 1a are used in that case.

[0027] On the other hand, when said high frequency circuit is constituted by chip-like a semiconductor device, a piezoelectric device, etc., it is carried by the face down bonding of the conventional common knowledge, or wirebonding on a multilayer-interconnection substrate, and bonding is carried out to the wiring 2 with which a multilayer-interconnection substrate corresponds through the metal thin line which consists of electroconductive glue, Au(s), etc., such as solder.

[0028] Furthermore, two or more notching 4 is formed in the maximum upper layer at least among two or more insulating-layer 1a which constitutes it, and the multilayer-interconnection substrate 1 mentioned above is exposing a part of grand wiring 2c inside notching 4 again.

[0029] Said notching 4 is for exposing the front face of grand wiring 2c to which the junction leg 6 of the shielding case 5 mentioned later is joined, and the same notching is altogether formed in insulating-layer 1a located more nearly up than this outcrop. For example, when notching is prepared only in insulating-layer 1a of the maximum upper layer when grand wiring 2c is prepared between the maximum upper layer of insulating-layer 1a, and the 2nd layer (insulating layer of a top to a two-layer eye), and grand wiring 2c is prepared between the 2nd layer



of insulating-layer 1a, and the 3rd layer, the notching 4 of the form which penetrates maximum upper layer and insulating-layer of 2nd layer 1a is formed. [0030] In addition, as for the end face of insulating-layer 1a which attends such notching 4, it is desirable to process it with a radius of curvature of 0.2mm - 0.4mm in the shape of a concave bend side, and if it is made such, it can prevent effectively that the crack on the basis of notching 4 etc. occurs in the multilayer-interconnection substrate 1 at the time of baking of the multilayer-interconnection substrate 1 etc.

[0031] And on the multilayer-interconnection substrate 1 mentioned above, the shielding case 5 which covers the top face of the multilayer-interconnection substrate 1 is attached. Said shielding case 5 is formed so that the shape of an abbreviation rectangle may be made with metals, such as iron, and nickel silver, phosphor bronze, and to the periphery section and a concrete target, the comparatively short junction leg 6 of die length faces caudad, and is set up at four corners.

[0032] Each junction leg 6 of said shielding case 5 is joined by solder in the condition of having made the outcrop of grand wiring 2c prepared in the four corners of the multilayer-interconnection substrate 1 contacting, after the lower limit is bent inside, and as the solder 7 for this junction is shown in drawing 3 R> 3, the part is held on the bending section of the junction leg 6, and it serves as a form allotted to vertical both sides to the bending section.

[0033] Thus, after making the junction leg lower limit of a shielding case 5 contact grand wiring 2c exposed on the top face of the multilayer-interconnection substrate 1, Since both were joined, junction to a shielding case 5 is preceded. As processing required for the multilayer-interconnection substrate 1 side It is not necessary to become the easy activity which pierces the ceramic green sheet by which a laminating is carried out to the upper part of the multilayer-interconnection substrate 1 in a predetermined configuration, and to form an end-face through hole electrode etc. in the joint by the side of the multilayer-interconnection substrate 1 like the electronic instrument of the conventional

example. Therefore, complicated manufacture processes, such as perforation processing accompanying formation of an end-face through hole electrode and covering of the electrode to a through hole inside, become entirely unnecessary, and it becomes possible to simplify the manufacture process of the multilayer-interconnection substrate 1, and to raise the productivity of an electronic instrument.

[0034] Moreover, said shielding case 5 is joined in the condition of having made the lower limit of the junction leg 6 contacting grand wiring 2c exposed on the top face of the multilayer-interconnection substrate 1. and from a good thing, the die length of the junction leg 6 by the short die length equivalent to one layer of an insulating layer thru/or the thickness for several layers which constitutes the multilayer-interconnection substrate 1 In case a shielding case 4 is attached on the multilayer-interconnection substrate 1, the junction leg 6 hits with the multilayer-interconnection substrate 1, and bends, or There is almost no un-arranging [ of being attached after the shielding case 5 has inclined to the multilayer-interconnection substrate 1 ], and the productivity drive of an electronic instrument can be presented with it also by this.

[0035] In addition, as for the die length of such the junction leg 6, it is more desirable than the total thickness of insulating-layer 1a which formed notching 4 to make for a long time a little, for example, when the thickness of the notching section is 150 micrometers, the die length of the junction leg 6 is set as about 200 micrometers.

[0036] Furthermore, said notching 4 is allotted to the four corners of the multilayer-interconnection substrate 1, respectively, and since the junction leg 6 of a shielding case 5 is joined in the four corners of the multilayer-interconnection substrate 1, it can make a shielding case 5 attach on the multilayer-interconnection substrate 1 in the condition of having been stabilized more.

[0037] Moreover, if only predetermined distance estranges the periphery edge of grand wiring 2c exposed in notching 4 in this case inside the periphery edge of the multilayer-interconnection substrate 1 and it is allotted to it Even if it is the

case where "many picking" of the large-sized substrate is divided and carried out to manufacturing the multilayer-interconnection substrate 1 From grand wiring 2c and the cutter for cutting not contacting at the time of division and cutting of a large-sized substrate There is also an advantage which cannot produce un-arranging [ that the edge of grand wiring 2c exfoliates from a substrate with cutting ], and can raise the productivity of an electronic instrument also by this. Therefore, as for the periphery edge of grand wiring 2c exposed in notching 4, it is desirable to estrange and allot only predetermined distance inside the periphery edge of the multilayer-interconnection substrate 1.

[0038] Furthermore, if it is made to attach in the multilayer-interconnection substrate 1 in the condition of having made the junction leg 6 of said shielding case 5 contacting the end face of insulating-layer 1a which attends notching 4, alignment of a shielding case to the multilayer-interconnection substrate 1 can be performed more correctly and easily, and the productivity and dependability of an electronic instrument will come to improve also by this. Therefore, it is desirable to make the multilayer-interconnection substrate 1 attach a shielding case 5 in the condition of having made the junction leg 6 of a shielding case 5 contacting the end face of insulating-layer 1a which attends notching 4.

[0039] While a shielding case 5 is held through the junction leg 6 and grand wiring 2c at a reference potential (ground potential ) and the electronic instrument mentioned above in this way can cover the noise from the outside good with a shielding case 5 by this at the time of the use , it will be prevented effectively that the electromagnetic wave of the high frequency supplied to the high frequency circuit of the multilayer interconnection substrate 1 has a bad influence on other device and other electronic instruments .

[0040] In addition, modification various by within the limits which is not limited to an above-mentioned operation gestalt and does not deviate from the summary of this invention, amelioration, etc. are possible for this invention.

[0041] For example, although solder was used with the above-mentioned operation gestalt as electroconductive glue for joining the junction leg of a

shielding case, and grand wiring of a multilayer-interconnection substrate, it may replace with this and both may be joined using electroconductive glue other than solder, such as conductive resin.

[0042] Moreover, although the multilayer-interconnection substrate was formed with crystallized glass, it replaces with this and you may make it form a multilayer-interconnection substrate in an above-mentioned operation gestalt using other ingredients, such as alumina ceramics and a glass fabric base material epoxy resin.

[0043]

[Effect of the Invention] While exposing some grand wiring which forms two or more notching in the maximum upper layer at least among the insulating layers which constitute a multilayer-interconnection substrate, and is prepared in the interior of a multilayer-interconnection substrate according to the electronic instrument of this invention From having made it join the junction leg of the shielding case periphery section to grand wiring exposed in this notching Junction to a shielding case is preceded. As processing required for a multilayer-interconnection substrate side It is not necessary to become the easy activity which pierces the ceramic green sheet by which a laminating is carried out to the upper part of a multilayer-interconnection substrate in a predetermined configuration, and to form an end-face through hole electrode etc. in the joint by the side of a multilayer-interconnection substrate like the electronic instrument of the conventional example. Therefore, complicated manufacture processes, such as perforation processing accompanying formation of an end-face through hole electrode and covering of the electrode to a through hole inside, become entirely unnecessary, and it becomes possible to simplify the manufacture process of a multilayer-interconnection substrate and to raise the productivity of an electronic instrument.

[0044] Moreover, it joins in the condition of having made the junction leg lower limit of a shielding case contacting grand wiring exposed on the top face of a multilayer-interconnection substrate according to the electronic instrument of this

invention. and from a good thing, the die length of the junction leg by the short die length equivalent to one layer of an insulating layer thru/or the thickness for several layers which constitutes a multilayer-interconnection substrate In case a shielding case is attached on a multilayer-interconnection substrate, the junction leg hits with a multilayer-interconnection substrate, and bends, or There is almost nothing, the attachment activity of the shielding case over a multilayer-interconnection substrate will become easy and good, and the productivity drive of an electronic instrument can be presented with producing un-arranging [ of being attached after the shielding case has inclined to a multilayer-interconnection substrate ] also by this.

[0045] Furthermore, according to the electronic instrument of this invention, a shielding case can be made to attach on a multilayer-interconnection substrate in the condition of having been stabilized more, by allotting the above-mentioned notching to the four corners of a multilayer-interconnection substrate, and joining the junction leg of a shielding case by these four places.

[0046] Furthermore, when only predetermined distance estranges and allots the periphery edge of grand wiring exposed in the above-mentioned notching inside the periphery edge of a multilayer-interconnection substrate according to the electronic instrument of this invention When manufacturing many multilayer-interconnection substrates by picking, at the time of division and cutting of a large-sized substrate Since it is prevented effectively that the cutter for cutting contacts to grand wiring, it cannot produce un-arranging [ that the edge of grand wiring exfoliates from a substrate with cutting ], and can raise the productivity of an electronic instrument also by this.

[0047] Furthermore, according to the electronic instrument of this invention, by making a multilayer-interconnection substrate attach a shielding case in the condition of having made the junction leg of the above-mentioned shielding case contacting the end face of the insulating layer which attends notching, alignment of a shielding case to a multilayer-interconnection substrate can be performed

now more correctly and easily, and the productivity and dependability of an electronic instrument improve also by this again.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the decomposition perspective view of the electronic instrument concerning 1 operation gestalt of this invention.

[Drawing 2] It is the sectional view of the electronic instrument concerning 1 operation gestalt of this invention.

[Drawing 3] It is the important section enlarged drawing of drawing 2 .

[Drawing 4] It is the top view showing the physical relationship of the exposed outside periphery of grand wiring, and the periphery edge of a multilayer-interconnection substrate.

[Drawing 5] It is the perspective view of the conventional electronic instrument.

[Description of Notations]

- 1 ... Multilayer-interconnection substrate
- 1a ... Insulating layer
- 2 ... Wiring

- 2c ... Grand wiring
- 4 ... Notching
- 5 ... Shielding case
- 6 ... Junction leg
- 7 ... Solder (electroconductive glue)

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[Translation done.]

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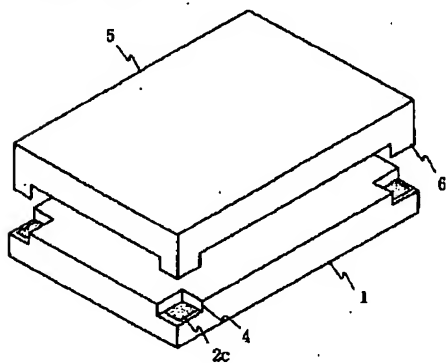
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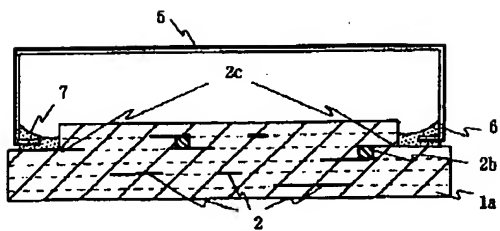
## DRAWINGS

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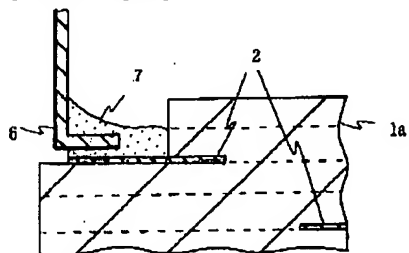
[Drawing 1]



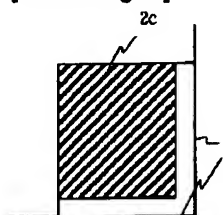
[Drawing 2]



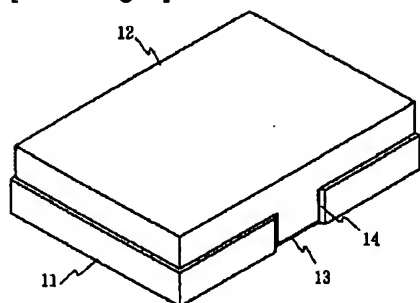
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]